

REMARKS

In view of the above amendments and following remarks, reconsideration and further examination are requested.

The specification and abstract have been reviewed and revised to make editorial changes thereto and generally improve the form thereof, and a substitute specification and abstract are provided. No new matter has been added by the substitute specification and abstract. Also, enclosed is a "marked-up" copy of the original specification and abstract to show changes that have been incorporated into the substitute specification and abstract. The attached pages are captioned "Version With Markings To Show Changes Made."

The instant invention pertains to an electroless-plating liquid and a semiconductor device having a protective film formed on a surface of an exposed interconnect, wherein the protective film is formed by performing an electroless-plating process with use of the electroless-plating liquid.

Specifically, the electroless-plating liquid comprises cobalt ions, a complexing agent, and an alkylamine borane that is free from alkali metal. Each of independent claims 24, 27, 31 and 34 are believed to be representative of the instant invention.

The use of an alkylamine borane that is free from an alkali metal, as a reducing agent, makes it possible to apply an oxidizing current to copper, a copper alloy, silver, or a silver alloy without use of a palladium catalyst, to thereby enable a direct electroless-plating operation to be performed. Additionally, use of an alkylamine borane which is free from an alkali metal prevents contamination of a semiconductor device with an alkali metal. Accordingly, use of such an alkylamine borane as a reducing agent as part of an electroless-plating liquid can reduce process steps for producing a semiconductor device, can increase throughput, and can prevent formation of voids in interconnects of the semiconductor device. This results in enhanced reliability, and avoids an increase of interconnect resistance which would otherwise result via palladium diffusion. Additionally, use of a plating liquid containing an alkylamine borane as a reducing agent allows for selective plating only onto an interconnect region.

The Examiner rejected claims 1-23 as being obvious over Fukuta et al. This rejection is respectfully traversed, and Fukuta et al. is not applicable with regard to the newly added claims for the following reasons.

Initially, please note that new claim 24 corresponds to a combination of former claims 1 and 2, new claim 27 corresponds to a combination of former claims 5 and 7, new claim 31 corresponds

to a combination of former claims 10 and 11, and new claim 34 corresponds to a combination of former claims 14 and 16. Accordingly, Fukuta et al. will be discussed as it was used in the rejection of claims 2, 7, 11 and 16.

In rejecting claims 2, 7, 11 and 16, the Examiner recognized that Fukuta et al. does not disclose an electroless-plating liquid that includes "an alkylamine borane that is free from alkali metal", and took the position that such would have been obvious to one having ordinary skill in the art since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for an intended use. The Examiner cited In re Leshin, 125 USPQ 416, for support of this position. It is respectfully submitted that the Examiner's reliance on Leshin is inappropriate for the following reasons.

While it is true that Leshin stands for the general proposition that merely substituting one material for another does not constitute patentable subject matter, this is only true when, aside from the different material, the claimed invention is not otherwise distinguishable from the prior art relied upon. Stated otherwise, if the only difference between a claim and the prior art is the material employed, then the claim possibly may not be patentable.

Specifically, in Leshin, the Court stated that

mere selection of known plastics to make a container-dispenser of a type made of plastics prior to the invention, the selection of the plastics being on the basis of suitability for the intended use, would be entirely obvious.

Thus, the general container-dispenser as discussed in Leshin was known prior to the invention at issue in that case, such that mere substitution of known materials was not patentably significant.

However, the instant invention is distinguishable from Leshin because the invention as recited in claims 24, 27, 31 and 34 was not generally known prior to Applicants' invention such that the use of a specific material may be of patentable significance, and indeed, with regard to the instant invention is of patentable significance for reasons set forth in the fifth complete paragraph on page 5 of this Amendment.

Unlike the container-dispenser of Leshin, the electroless-plating liquid as recited in the claims is novel and has not been shown to be known, and unlike the plastic used to make the container-dispenser of Leshin, an alkylamine borane that is free from alkali metal, as a reducing agent to be used as part of an electroless-plating liquid also has not been shown to be known.

Accordingly, unlike Leshin, Applicants are not merely using a known reducing agent in a known electroless-plating liquid, but rather have developed a novel electroless-plating liquid that, because of inclusion of a specific alkylamine borane, exhibits benefits relative to known electroless-plating liquids. Thus, claims 24-37 are allowable Fukuta et al.

Similarly, new claim 38 is also allowable over Fukuta et al. for reasons analogous to those expressed above with regard to claims 24, 27, 31 and 34. In this regard, new claim 38 corresponds to former claim 21 in that new claim 38 recites a semiconductor device having a surface of an exposed interconnect covered with a protective film of "an alloy comprising cobalt and a refractory metal". The Examiner recognized that Fukuta et al. does not disclose a protective film of an alloy comprising cobalt and a refractory metal, and thus relied upon Leshin for finding claim 21 to have been obvious to one having ordinary skill in the art.

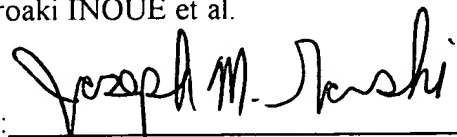
However, the Examiner's reliance on Leshin is misplaced, since the protective film as recited in claim 38 has not been shown by the Examiner to be known in the field of semiconductor devices. Thus, for reasons analogous to those expressed above with regard to claims 24, 27, 31 and 34, claim 38 is also allowable over Fukuta et al.

In view of the above amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and an early Notice of Allowance is earnestly solicited.

If after reviewing this Amendment, the Examiner believes that any issues remain which must be resolved before the application can be passed to issue, the Examiner is invited to contact the Applicants' undersigned representative by telephone to resolve such issues.

Respectfully submitted,

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